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COMMONWEALTH PHYTOPATHOLOGICAL NEWS

A QUARTERLY REVIEW OF NEWS AND VIEWS ISSUED BY THE COMMONWEALTH MYCOLOGICAL INSTITUTE, KEW, SURREY

NOTES ON MICROTECHNIQUE

H.A. Dade
Commonwealth Mycological Institute

Slide Cultures

Visitors to the C.M.I. have seen our method of growing fungi on microscope slides and cover glasses in order to obtain microscopical preparations of undisturbed growth which reveal the details of spore production. A more satisfactory and much simpler technique has recently been perfected by Mrs. J. Gunnell, working in our Culture Collection, and this is giving excellent results. Not all fungi are amenable to either method, which work best with forms which do not make tall aerial sporophores.

A suitable medium is poured into a Petri dish and allowed to set. Then, with the point of a sterile scalpel, a cruciform incision is made in the agar (fig. 1). One by one, four flamed cover glasses are inserted, by means of forceps, under the triangular flaps of agar made by the incisions (fig. 2). The dish is then covered and inverted, and the outlines of the covers are drawn with a grease pencil on the bottom of the dish. The dish is again turned over. The outlines of the covers are now visible, and a small square is cut out of the agar above the centre of each cover, exposing the glass surfaces (fig. 3). The plate is then inoculated in its centre (or at any more convenient point) and the ensuing growth spreads out radially, creeping over the exposed parts of the covers and sporulating in due course. When the required stage of development has been reached, the remaining agar is removed, the most convenient way of doing this being to cut the agar in the directions indicated by the broken lines in fig. 3. The covers are then removed by sliding them to the edge of the dish, where they can be picked up with forceps. It is often advisable to sever the mycelium round the edges of the open squares before disturbing the remaining agar, thus preventing the required growth from being pulled off the covers.

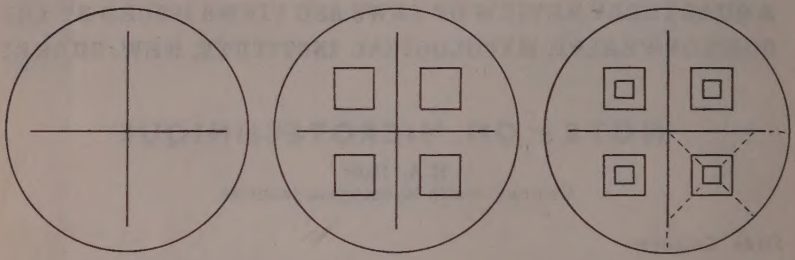
A drop of lactophenol is placed on each cover and warmed, after which it is inverted on to a slide and sealed in the usual way. The advantages of the new method are that the growth is in the middle of the cover instead of near its edges as in the older method, and that no precautions are needed to prevent desiccation during incubation. Moreover, the large amount of medium available to the fungus favours in most instances abundant sporulation.

Sealing Lactophenol Mounts

We continue to use nail lacquer for sealing preparations in lactophenol, a method proved to be satisfactory after more than ten years' experience. This cement adheres well to glass, does not react with lactophenol, and has no effect on the cotton blue stain. No other sealing compound has been proved to have these advantages.

Library

Any good nail lacquer will do, so long as it is free from solid sediment. We prefer to use colourless lacquer for the first coat, thus avoiding the unsightly result when a little coloured lacquer runs under the cover. For subsequent coats, coloured lacquer has the advantage of showing clearly where it is being laid on. The thickness of the seal formed by the first two or three coats is very thin at the angles of the edges of the covers, and especially at the corners of square covers,



1 2 3

therefore for permanent sealing additional coats should be applied. Square covers are used at the C.M.I. for routine preparations because the sealing operation takes less time than in the case of round covers ringed on a turntable. Nail lacquer, however, runs on very easily when a turntable is used.

There is no reason why some other favourite cement should not be used to complete the sealing after two coats of colourless lacquer have been put on to prevent contact between the lactophenol and the finishing cement.

A No. 3 sable water-colour brush is very suitable for applying nail lacquer. The nuisance of repeatedly cleaning the brush is avoided by suspending it, when it is not in use, in acetone vapour, which prevents it from drying. This we do by supporting the brush in a bored cork fitted tightly to a bottle containing acetone.

A good seal depends on the glass to which the lacquer is applied being quite clean and dry. After some kinds of manipulation, such as that of growing cultures on covers, it is virtually impossible to keep the glass free from exuded lactophenol. This difficulty can be overcome. Most of the moisture can be removed by laying a piece of blotting paper over the slide, holding it down to prevent shifting the cover and then running a finger above the edges of the cover, pressing down gently. A very narrow band of colourless lacquer is then applied to the edge of the cover and the surrounding part of the slide; this will not, of course, make a good seal, but when it has set it will anchor the cover. The slide can then be washed under the tap, and finally rinsed with distilled water and allowed to dry. The glass now being clean, broader bands of lacquer are laid on to make a good permanent mount.

Efficient sealing may be further ensured by using a water-repelling silicone, i.e., repelcote, sold by Messrs. Hopkin and Williams, Ltd., of Chadwell Heath, Essex. This is a solution of dimethylsilane in carbon tetrachloride, and it costs 15s. for 500 ml., the minimum quantity sold. Before mounting begins, the silicone is brushed on the areas which will carry cement, avoiding the area which will be occupied by the material. A simple way of doing this is to lay the slide on a card marked with the outline of the slide and cover, both when applying the silicone and when putting on the cover. Repelcote may also be applied after anchoring and

washing a dirty mount as described above. The silicone solvent evaporates at once, and the effect is quite permanent; in fact, all efforts to remove the deposit have failed. By repelling moisture, the treatment ensures that the lacquer is put on dry glass and later ullage from the sealed mount inhibited. (N.B. Care should be taken to keep silicone away from glassware which must be wettable, e.g., measuring vessels, in which the silicone will prevent the formation of a meniscus.)

FROM NEAR AND FAR

The tercentenary of the Royal Society will be celebrated between 18 and 26 July 1960. There will be a presidential address, 10 tercentenary lectures by Fellows, exhibits, and visits to research centres. It is expected that there will be representatives of 31 national acadamies and about 130 universities from nearly 50 countries. The formal opening ceremony will be at the Albert Hall, London, on July 19.

At the Fifth World Forestry Congress to be held in Seattle, U.S.A. from 29 August to 10 September 1960, Section III will be devoted to the entire field of forest protection from diseases, pests, and fire.

F.N.G. Conaty reports the first occurrence of Phytophthora palmivora causing black pod of cacao at Serdang, Malaya, in November 1959.

An official research study group has been set up in U.K. under the chairmanship of Professor H.G. Sanders to study the need for further research on toxic chemicals residue in agriculture and food storage. W.C. Moore, director of the Plant Pathology Laboratory, Harpenden, and G.G. Samuel of the A.R.C. are members.

The annual report for 1959 of the United States National Science Foundation discloses that of over $137 m. total appropriation nearly $20 m. was devoted to basic research in biological and medical sciences, with a further $3¼ m. for research facilities. Graduate fellowships amounted to $13 m. odd.

The Microcard Foundation and Microcard Corporation have moved from Wisconsin to a new joint office at 901, 26th Street, N.W. Washington, D.C., U.S.A.

The Union of Burma joined the Plant Protection Agreement for South East Asia and Pacific Region on 4 November 1959.

According to a recent report of F.A.O. Plant Protection Committee for the South East Asia and Pacific Region new research is going on in Pakistan on leaf curl of cotton, the fungal flora of paddy seeds and soil, and foliage, and soil and seed-borne diseases of groundnut. A new record from India is Pythium vexans causing a canker of Hevea.

Publications of Interest

The fifth edition of the Ainsworth and Bisby dictionary is now at the press. There are many new entries and revisions and the figures have been completely re-drawn. Also very nearly complete is a companion volume, whose title has not yet been decided, comprising a history of the C.M.I. written by Dr. Wiltshire together with accounts of techniques and methods used in Herb.I.M.I. and the Culture Collection and a series of short articles on the connection between the Herbarium and the other activities of the Institute, written by various members of the staff.

The Journal of the Institute of Biology has metamorphosed in new guise with the appearance of Vol. 7. The format has been changed to medium octavo and the somewhat drab cover of the past replaced by one of blue which does not invite prolonged regard - no doubt a psychological device to hurry the reader to the contents.

These comprise the welcome notes on Institute affairs and letters from members together with a good account of a recent symposium on land utilization in the Scottish Highlands, and the usual book reviews, providing 38 pages of interesting reading.

A VISIT TO THE OXOID CULTURE MEDIA LABORATORY

Some members of C. M. I. staff paid a visit with the Institute of Biology to the culture media factory of Oxo Ltd. in London.

It may seem a far cry from the million-acre ranches in South Africa and South America, from the many food and canning factories throughout the world, to culture media. But the link is a strong and natural one. A factor that made OXO's participation in the manufacture of culture media a natural one is that many raw materials used in making culture media are of animal origin. And so it came about, accelerated by wars and a dollar shortage, that the laboratories of OXO Limited became one of the world's largest manufacturers of dehydrated culture media.

Dehydrated Culture Media

Dehydration has long been known as a practical method of preparing culture media and has proved to be extremely successful in making immediately available media which by original methods can take days to make up. The dehydrated culture media supplied by OXO Limited under their wellknown trade mark 'OXOID' are claimed to be standard in formula, consistent in results, stored in a small space, cheap to transport, and economical to use.

Many developments in the Oxoid laboratories have led to the creation of media which are superior in growth and selectivity to some of those prepared in the old fashioned media kitchen. Large scale manufacture using selected and pooled raw materials result in products which are substantially free from batch to batch variation.

What the Members Saw

A feature of the peptone manufacturing plant was the maze of pipe lines, vessels and engineering equipment reminding one of 'the shape of things to come'. Here one ton of meat is minced and digested with suitable enzymes each day in stainless steel vessels, thus obviating any contamination with undesirable metals. Large-scale filter presses which clarify the liquor from the digestors are fed with the liquors by a compressed air system.

Several types of vacuum evaporators were seen, the principle involved being the evaporation of large volumes of liquids at a low temperature under vacuum.

An interesting feature was a specially designed climbing film evaporator entirely fabricated in glass; it is capable of rapidly evaporating heat sensitive liquids such as pancreatin solution without loss of activity.

Another interesting piece of equipment was a special type of spray dryer where in liquids are spun into a mist which falls through a heated chamber and is finally collected in the form of a dry powder.

Various kinds of grinding, sieving, and mixing machinery were in operation. The drying of granules in a special sectionalized vacuum dryer was shown in operation. Tablets of culture media were shown being made at approximately 100 per minute in air-conditioned low humidity rooms.

There is a series of rooms in which the air is filtered and treated with ultra violet light to decrease the possibility of bacterial contamination. Here the party saw the mechanical filling of Lowenstein-Jensen medium, which is used for the cultivation of the tubercle bacillus, into bottles. More than ten thousand are produced weekly from nearly one thousand new laid eggs. In another room the preparation of ready-to-use culture media in sterile plastic petri dishes was in operation, a service which has proved extremely popular. Once the dish and media have been used they may be disposed of in the incinerator or sterilized and thrown out with the rubbish.

After the tea interval the party were taken to one of the bacteriological lab-

oratories where a number of demonstrations were on view.

Multodisks is a device made of filter paper containing a number of projections from a central 'hub', each of which has been impregnated with a different antibiotic. The reaction of a number of antibiotics against an organism can be made by placing one of these devices on to a petri dish of medium which has been inoculated with the test organism. The technique for the assay and performance tests was explained.

Single discs impregnated with various diagnostic reagents such as optochin, which is used to differentiate streptococci, were demonstrated.

Membrane Filtration is a comparatively new technique employing a thin porous sheet of cellulose acetate known as a membrane filter. It will retain bacteria and thus provides a means of concentrating a few bacteria from a large volume of liquid. Moreover, the bacteria may be cultivated in situ on the membrane by placing it on a special pad which is impregnated with a suitable culture medium.

A number of interesting pathogenic fungi were exhibited growing on Oxoid Sabouraud agar and a selection of fungi of industrial importance were shown cultivated on Oxoid wort agar and Czapek dox agar.

The testing of gelling properties of agar was shown where a metal spade is allowed to revolve against the resistance of the gel, thus giving an indication of its strength, which can then be computed in terms of percentage of agar to be used in the preparation of culture media.

A large number of selective and differential culture media were demonstrated showing diagnostic haemolytic and biochemical reactions.

Testing of pressure sterilizers by the quantitative destruction of bacteria and the separation of protein fractions by electrophoresis using Oxoid cellulose acetate strips were also shown, as were the various well known Oxoid laboratory gadgets.

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(continued from p. 24)

Dr. H. Godwin, F.R.S., reader in Quarternary Research at Clare College, has been elected professor of botany at Cambridge in succession to Professor G.E. Briggs F.R.S.

Dr. C.J. Hickman, reader in plant pathology at Birmingham University has been appointed professor of botany at the University of Ontario.

H. Woolridge has been appointed director of the Forests Products Research Laboratory, Princes Risborough, to follow Dr. F.Y. Henderson, O.B.E., who will retire in October 1960.

Dr. D.J. Carr of Melbourne University has been appointed to the Chair of Botany at Queen's University, Belfast.

Professor J.W. Heslop-Harrison has been appointed professor of botany at Birmingham University and Dr. J.L. Harper to the chair of Agricultural Botany at Bangor.

G.W.G. Briggs has been made assistant director of N.I.A.B., Cambridge. He was formerly in charge of the Seed Production Branch.

Dr. M. Woodbine has been appointed reader in Agricultural Microbiology at Nottingham University.

Dr. J.A. Roper has been appointed to the new chair of genetics at Sheffield University, where it is understood he will continue his researches on extracellular inheritance in Aspergillus.

Drs. M.E. Davies and Nancy Montgomery have been appointed lecturers in botany at Birmingham University. P.R. Bell and P.J. Syrett have been appointed as readers in botany at University College, London.

Dr. E.A. Riley, formerly of Tanganyika Department of Agriculture, and R.H. Cammack, lately with the West African Maize Research Unit, are now at the Ministry of Agriculture, Fisheries and Food Plant Pathology Laboratory, Harpenden.

OBITUARY

We have to announce with regret the deaths of H.F. Barnes who joined in 1927 and was treasurer to the Association of Applied Biologists since 1947 and David Wheatley, plant pathologist, who recently left the Kumasi College of Technology, Ghana, to take up a post at the University College, Ibadan, Nigeria.

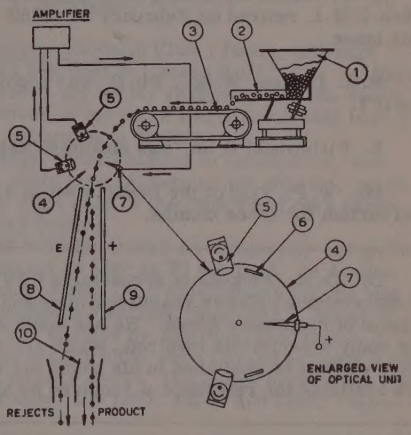
Gerardo O. Ocfemia, Professor emeritus, University of the Philippines, died of a circulatory breakdown in Pasay City, Philippines, on 16th November, 1959, at the age of 67. Dr. Ocfemia belonged to the brighter group of the early students of the Philippines College of Agriculture at Los Banos, Laguna Province, and received his Ph.D. training in plant pathology and mycology at the University of Wisconsin, Madison, U.S.A. For many years Dr. Ocfemia was professor and head of the Plant Pathology Department of the College of Agriculture of his country's state university, and was considered as the dean of the Philippines plant pathologists and mycologists. At the time of his death he was professor and head of the Plant Pathology Department of the Araneta University, Malabon, Rizal Province, Philippines. Dr. Ocfemia was largely responsible for the training of his country's present plant pathologists and mycologists. He was a prolific researcher and writer, having made a substantial contribution to the literature on Philippines plant diseases, many of which have found a place in the reference collections of the leading agricultural research institutions all over the world including the U.K. and Commonwealth Mycological Institute.

Quintin A. Eala

ELECTRONIC SEED SEPARATOR

The 'Sortex' manufactured by Messrs. G.W. Gunson (Seeds) Ltd., London, has been designed for the automatic colour separation of small grains from the size of rice up to that of split peas.

By means of a patented method of electrostatic colour separation, the machine sorts such grains out rapidly and with complete accuracy. Grains which are spotted or stained, and coloured foreign bodies are rejected. The running cost is very low, the power consumption being only 450 watts; maintenance costs are very light, and a single operator can work up to 50 machines.



The machine colour-separates decorticated rice grains at a rate of up to 180 lb. an hour and also handles such jobs as the separation of ergot (Claviceps purpurea) from rye, red wheat from white, black oats from white oats, and so forth.

The articles to be sorted are fed from the hopper (1) by means of a vibrating chute (2) so as to align themselves on the grooved belt (3), by which they are projected in single file to a place of even illumination (4) and inspection by 2 photocells (5) from opposite sides. Any articles which are stained or appear to be different in colour from the backgrounds (6) receive a charge (7). They continue along their normal trajectory into the electrostatic field created by deflectors (8) and (9), and those which are charged are drawn out to the other side of a dividing edge (10) for separate collection.

Separation is automatic and occurs in mid-air without mechanical aid or guidance. The charge is virtually instantaneous and is lost almost instantly, without affecting the internal composition or the germinability of the seed itself.

The machine is contained in a single cabinet occupying floor space of only 54" × 20", and the instructions provided enable the electronic circuitry to be easily followed by an ordinary radio mechanic.

"He knew little about agriculture but ..... he had a wide view of the necessities. 'I shall predict', he said, 'that unless the prevention of disease among plants and animals and all other scientific problems of the supply of food are studied on the same kind of scale by men of similar calibre as are the problems of human health, chaos and misery will result.'." - F. Brundrett in Obituary of Sir Henry Tizard. NATURE, LOND.

How right he was.

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PERSONAL NEWS

C.M.I. News

E.W. Mason for many years head mycologist at C.M.I. and the originator of Herb.I.M.I. retired on February 14, 1960. A fuller note appears elsewhere in this issue.

R.R. Davies, M.Sc., Ph.D. was appointed as an assistant mycologist on April 1.

K. Pirozynski B.Sc. was appointed assistant in mycology on March 1.

Mr. W.P. Ting of the Department of Agriculture, Malaya, is working in the Herbarium for three months.

Dr. G.M. Wickens is preparing a PHYTOPATHOLOGICAL PAPER on methods of determining relative resistance of cotton to X. malvacearum, and of differential effects of resistance genes. He has made a very exhaustive statistical analysis of the many experiments involved, which are fully described and tabulated in detail. They will not be published in his paper but are deposited in the C.M.I. library and are available for reference if required by any recognized research worker.

Visitors

A party from the Distillers Coy Ltd., Research Laboratory, Epsom, Surrey, visited the C.M.I. in February.

Among overseas visitors were A.S. Yadav, Patna, India; W.P. Ting, Malaya, K.C. McOnie, South Africa; P.O. Wiehe, Mauritius; J.G. Gibbs, Wellington, New Zealand; Q.A. Eala, Manila, Philippines.

Appointments, Promotions, Retirements, etc.

The Overseas Division of the Colonial Office announce the following appointments: G.W. Anderson, assistant director of agriculture (field), Uganda; T.S. Bakshi, ecologist, Sierra Leone; J.M. Cave, deputy director of agriculture (science), Barbados; J.W. Dancer, botanist, Uganda; R. Smith, assistant director of agriculture, N. Borneo; A. Storrar, deputy director of agriculture, Kenya.

Walter Ives, liaison officer for C.A.B. in Australia and one-time member of the C.A.B. Executive Council has been appointed as executive officer in the top administration of the C.S.I.R.O., Australia.

Sir Eric Ashby has been appointed a member of the University Grants Committee by the Chancellor of the Exchequer.

Professor E.G. Cox of Leeds University will succeed Sir William Slater as secretary of the Agricultural Research Council on the retirment of the latter in June 1960.

Sir George Thomson was installed as president of the British Association for 1960.

Dr. R.H. Barnell has been appointed chief scientific advisor (food) to the Ministry of Agriculture, Fisheries, and Food.

Dr. T.C.S. Morrison-Scott, director of the Science Museum, will succeed Sir Gavin de Beer, F.R.S., as director of the Natural History Museum, London, on 1 May, 1960.

(continued on p. 22)

OVERSEAS NEWS

CANADA

BARLEY SCALD IN THE PRAIRIE PROVINCES OF CANADA

by W.P. Skoropad

The disease, caused by Rhynchosporium secalis (Oud.) Davis, although recorded in Europe since 1894, was not reported in Canada until 1922. Scattered occurrences of scald have been observed in all barley regions of Canada but it has reached its most damaging proportions in the large and concentrated barley areas of central and northern Alberta and northern Saskatchewan.

R. secalis attacks plants at any stage, from seedling to senescence, and though most conspicuous on the leaves scald also appears on the sheaths, seeds, and awns as oval or lens-shaped spots, light grey in the centre and dark brown at the margin, and shredding of leaves may occur.

In its epiphytotic form barley scald kills the leaves so completely and quickly that reductions in yield have been estimated as high as 30 per cent. In Alberta yield losses have been determined by paired-plot field experiments for the last three summers. Parkland, a highly susceptible variety, was used. About 80 per cent. of the total leaf blade area was scalded by artificial inoculation in diseased plots, while lesions on companion healthy plots were limited to about 5 per cent. of the leaf area by spraying with dithane D-14. The highly significant yield reductions averaged 12, 11, and 10 per cent. for 1957, 1958, and 1959, respectively.

Laboratory experiments have shown that temperature and moisture are the key factors in sporulation, infection, and subsequent scald development. The fungus overwinters as dormant mycelium in or on plant debris or seed, and sporulates most readily and abundantly when infected material is floated on water or held under saturated conditions for 48 hours at about 10-18°C. Temperatures of 27-30°C. under moist conditions for even a couple of hours not only prevent the production of new spores but also destroy existing ones by causing them to swell and rupture. Germination of conidia in saturated conditions or in free water commonly occurs in a few hours at 15-18°C. and infection is often well established in about 10 hours under cool, moist conditions. After infection higher temperatures of about 24°C. favour scald development and symptoms appear on most barley varieties in 11 days.

In the Field

The pattern of scald development in the field has verified laboratory findings. Most scald lesions appear in about 12 days following the first rain after the emergence of seedlings, initial infection being almost invariably on the first leaf. Contact of the first leaf with crop residues facilitates its inoculation by conidia, which are produced shortly after a rainfall. Spring rains are usually cool and temperatures, especially at night and often during the day, are sufficiently low to encourage infection. Splashing rain and wind probably spread conidia from primary leaves. Barley plants in nearby fields free of scald-infested debris tend to develop lesions later and on upper leaves first, which indicates that secondary inoculum is wind borne.

The serious barley scald situation in the northwestern regions of the Prairie Provinces is most probably attributable to favourable local temperature and moisture conditions, but other factors have contributed to the marked increase in the severity of this disease during the last fifteen years. These include: (1) intensification of barley cropping; (2) failure to practice rotation of crops; (3) wider use of thresher combines which leave the straw uniformly distributed over the fields, and (4) the increased practice of shallow cultivation. Large quantities of infected debris are at present often left at or near the soil surface in a position to provide inoculum for the emerging seedlings.

Barley seed and awns can be infected by R. secalis and thus they become an additional source of primary inoculum, important especially in long range dissemination and infestation of clean fields. The remains of floral parts, as well as the rough inner surface of the lemma, and the outer surface of the pericarp, are

largely responsible for the location of scald lesions on the tip of the seed below the awn. The cool, moist condition of the soil in spring encourages sporulation of the mycelium. Conidia are thus available to be deposited on the coleoptile as it emerges from underneath the lemma. The coleoptile may be infected and thus serve as a source of inoculum for the emerging leaves. It is interesting to note that a natural opening located slightly below the tip of the coleoptile and adjacent to the lemma causes conidia to be trapped as it brushes past the lesion and provides a moist chamber for initiating infection. A high soil temperature during seed germination drastically reduces the incidence of coleoptile infection, probably because it tends to reduce production of conidia. Frequently, however, the coleoptile breaks through the lemma at the embryo and so bypasses the lesion and escapes infection.

Cultivars and Races

The period of time between inoculation and the appearance of scald symptoms under conditions favourable to infection varied from 7 to 19 days; the cultivar Moore was in the lowest and Vantmore in the highest class. Most of the commonly grown cultivars develop scald symptoms in 11 days. Two factors predisposing barley to infection are water congestion of the leaves and exposure to low temperatures of about 10°C. for one day. Cultivars that normally show a high degree of resistance may be quite susceptible under these conditions. This may partly explain the variability in the reaction of some cultivars under field conditions.

Frequent tests involving 22 differential cultivars and 15 isolates have failed to show any clear-cut pathogenic strains of R. secalis in Western Canada. There are distinct differences in the various growth characteristics in culture, and differences exist in the period of time required for the symptom expression, but the end result, given sufficient time, is the same. Recently, however, an isolate of the fungus from Ontario has proved to be distinctly different pathogenically from the western isolates. Furthermore, a barley test that is being conducted in Argentina and Alberta has shown that these two areas have different pathogenic races of the scald organism.

Because of the enormous amount of inoculum present it appears that apart from rotation the most practical means of control is in the breeding and use of resistant cultivars. Unfortunately, most of the common ones in western Canada are highly susceptible but sources of resistance exist in some that are agronomically unacceptable here. Their resistant genes are already being utilized, especially by the barley breeders at the Experimental Farm, Lacombe, Alberta, where promising material is now in the F_5 generation. Cultivars that exhibit high resistance to western Canadian isolates of R. secalis are: Osiris C.I. 1622, Turk C.I. 5611-2, Coast C.I. 691, Quinn C.I. 1024, Little Ben C.I. 4686, Barley 305 C.I. 6015, Bey C.I. 5581, Ellis C.I. 2107, C.I. 5366, Vantmore and Rivale.

The Causal Organism

In artificial culture R. secalis is an extremely slow growing fungus, and on most common agar media it turns from pink to black in about 3 weeks. In this black condition it ceases to sporulate, and is often difficult to transfer successfully. It is also difficult to accelerate its rate of growth, but its freshness and ability to sporulate can be prolonged in certain media. Both lima bean and malt-yeast extract agar greatly favour sporulation, especially when the agar content is kept low (1.5 per cent.). Cultures sporulate best at 15-18°C. and conidia are destroyed at temperatures above 27°C.

Cells of mycelium as well as those of conidia are uninucleate. A multinucleate condition is to be found only in large, rounded bodies that appear occasionally in intercalary and terminal positions. These thin-walled cells are easily separated and on germination produce typical mycelium.

Conidia, which are predominantly 2-celled, are produced profusely, often in a fan-like pattern, as direct outgrowths from any cell of the mycelium or from other conidia. Young conidia are single-celled and have not been observed to germinate before forming a septum. Before germination each cell of the conidium swells, and since the septum remains unchanged the conidium becomes decidedly

constricted. A single germ tube usually emerges first from the beak of the larger cell but occasionally two tubes may arise from each cell. Conidia have a tendency to break apart at the septum and this fracture prevents further development.

Microconidia may emerge from phialide-like structures that arise from hyphae, from the large round bodies, or from conidia. They appear in nature as well as in culture but the exact conditions evoking their production have not been determined. They have been produced, although not consistently, on a variety of common agar media at 10-18°C. but certain special media, for example prune agar, are somewhat more favourable. Limited experiments have failed to reveal their function.

RING SPOT OF RAPE IN CANADA

A New Record

Ring spot (Mycosphaerella brassicicola (Fr.) Lindau) was found to be general in one area of east-central Saskatchewan on the stubble of turnip summer rape (Brassica campestris L. var. annua Reichb.) var. Polish in late August and early September, 1958. This disease is generally considered to be restricted to humid coastal areas of the world (Nelson, M.R. and Pound, G.S., PHYTOPATHOLOGY, 49: 633-640, 1959). There is some disagreement regarding the seed-borne nature of the disease. The finding of this disease in a central, northern, sub-humid area of the continent is surprising and of some interest. It is a new record on rape for Canada, but has been reported on cabbage and cauliflower in British Columbia.

The area concerned is just inside the parkbelt and has an annual precipitation of 15 inches, half of which falls as rain during the growing season. The lower evaporation rate and higher humidity of the area, compared with the open prairie 100 to 200 miles to the southwest, are sufficient to account for the establishment of the disease. It is suspected that heavy dews are also a contributing factor.

Cultures of the pathogen have been obtained from stem lesions and from seed from lesioned siliques. The disease is perpetuated by diseased seed and crop residues. The time of development and maturation of the perithecia on the stubble remains to be determined.

Present observations indicate that ring spot could be severe on rape in wet years where careless farming is practised. It should be possible to eliminate the disease from the area or to reduce it to an insignificant minimum by first adopting proper crop rotations, secondly by using disease-free seed grown on the dry, open prairie outside the parkbelt, and thirdly by burying the old crop refuse before the new crop is sown.

A more complete account of this study will appear elsewhere.

Department of Biology,
University of Saskatchewan,
Saskatoon, Sask.

T.C. Vanterpool

STAFF NOTE

Dr. C. Madosingh recently joined the staff of the Plant Research Institute, Ottawa, to assist in the identification of wood-destroying fungi from their cultures. Born in Jamaica, he received his undergraduate training at the Imperial College of Tropical Agriculture, Trinidad, and at the University of British Columbia. He obtained his B.S.A. from the latter institution in 1954 and his Ph.D. from the University of Western Ontario in 1959. During the summer vacation he worked successively at the Forest Biology Laboratory, Victoria, B.C.; in the Department of Medicine at Western Ontario; and at the Forest Products Laboratory, Ottawa. Because of his training in physiology, he hopes to apply biochemical methods to the identification of the wood-destroying organisms.

I.L. Conners

"The doctor is optimistic, but he says he has only known it to affect tomatoes before."

AUSTRALIA

Eradicant Treatment for Apple Scab

From the results of investigations over the past seven years it is now clear, states K.E. Hutton of the N.S.W. Department of Agriculture, that the use of a post-harvest spray of a powerfully eradicant fungicide such as phenyl mercuric chloride is of great value in controlling apple scab in N.S.W.

The spray should be applied very thoroughly as soon as possible after harvest. For best results the ground must be free of tall trash which would shelter the early cast leaves. Where these requirements are met there is usually no necessity to give any special attention to spraying the ground, especially where an automatic airblast sprayer is used. The litter of treated leaves should then be left undisturbed on the ground for as long as possible the following season. Even then, mowing, where possible, is preferred to cultivation.

Several methods of using this treatment have been investigated, and a number of recommendations will shortly be issued for various parts of N.S.W. In this State the scab problem varies greatly because of the wide range of climatic conditions under which apples are grown. The methods are as follows:-

1. Post-harvest spray of 0·01 per cent. P.M.C. followed by the usual complete schedule of protective sprays the following season. This spray reduces inoculum by 95 to 99 per cent. and greatly reinforces the protective programme, especially in districts where scab infection is often severe. No isolation is required to make use of this method.
2. Post-harvest spray of 0·05 per cent. P.M.C. followed by a reduced spraying schedule the following season. The full extent of the reduction is not yet certain but it is clear that no pre-pink spraying is required even in the district of N.S.W. most liable to scab. Little isolation is required to use this method successfully, but best results are likely by uniform community adoption of the method.
3. Post-harvest spray of 0·1 per cent. P.M.C. as a single spray treatment to control scab the following season. It may be necessary to repeat the spray annually, in which case, after the first or second season (depending on the success of the initial spray), the concentration may be reduced to 0·05 per cent. In some locations a stage will be reached after about three seasons where it is safe to withhold the spray for at least one season and possibly for a number of seasons. Effective isolation of the individual orchard or group of similarly treated orchards is required for the successful use of this method.
4. It has been found that P.M.C. at concentrations as low as 0·01 per cent. is very effective in killing mature perithecia in late winter. Present preliminary field evidence of the use of this chemical, at higher concentrations, as a late winter ground and tree spray, indicates that this may be a valuable method in aiding scab control, particularly in any orchard where it has not been possible to apply the pre-leaf fall eradicant spray.

Hermetical Handling of Bananas

Success has been reported by Dr. Franco Beccari of the Instituo Agronomico per L'Oltremare in shipping bananas as deck cargo from Somali to Italy (OLIN MATHIESON CHEM. CORPN. AGRIC. BULL. 43, 1959). The bunches received prior treatment in mycostatin and salicylics to restrict decay and were sealed in polythene envelopes to delay ripening. During a number of trials bananas were maintained in a green condition for 27 to 36 days at an average temperature of 30°C.

Preliminary trials conducted by the N.S.W. Department of Agriculture have tended to confirm Beccari's results. Fruit cut at 3/4 full stage and treated in agricultural grade mycostatin and salicylanilide and sealed in polythene were in a firm green condition after 14 days storage in an incubator constantly maintained at 27°C. The fruit was subsequently ripened at 20°C. and was satisfactory in colour and flavour.

Storage trials of bananas similarly treated to restrict fungal decay and sealed in polythene have been commenced at lower temperatures. Clusters of Cavendish

bananas at 3/4 full stage have been maintained in a green condition for 6 and 8 weeks in incubators at 10°C. and 15°C. and have been ripened satisfactorily. Trials are in progress in which different grades and densities of polythene are being employed with the aim of evolving a process which might assist in stabilising banana prices on the Australian market and possibly allow overseas export.

C.J. Magee

SOUTH AFRICA

Dr. J.P. Martin of the University of California Citrus Experiment Station, Riverside, California, spent his sabbatical leave in South Africa in 1959 and worked on the citrus replant problem with special reference to the microbial population of citrus and virgin soils. His findings were of great interest and emphasize the need for further research. Cropping of South African soils to citrus brought about a decrease in the relative abundance of favourable fungus species and an increase in the less desirable forms. In virgin soils the most common fungi were Trichoderma viride and Aspergillus fumigatus, both of which have been reported to be antagonistic to various root parasites of plants. In citrus soils T. viride decreases in relative abundance and A. fumigatus almost disappears. In their place Fusarium solani becomes dominant, and Fusarium oxysporum and other Fusarium spp. common. Possibly three distinct species of Phytophthora, one of which seemed to be P. citrophthora, were isolated from many citrus soils.

GHANA

As a result of earlier observations on dissimilarities between isolates from Ghana and Nigeria of Phytophthora palmivora, the causal fungus of black pod and other infections of cacao, an extensive survey is in progress at the West African Cocoa Research Institute of the possible occurrence of different varieties of the pathogen. Results to date have shown that in West Africa there are marked differences between the dominant type of pathogen in one group of cocoa-producing countries, comprising Ghana, Ivory Coast, and Sierra Leone, and that of another group, namely, Nigeria, Southern and French Cameroons, Fernando Po, and, probably, Gabon. The isolates of the first group are typical of P. palmivora, and are very similar to those examined from other, non-African, cocoa-growing countries.

It is planned to extend the survey by comparison of West African isolates with others from as many different territories as possible. Strict precautions are taken to prevent the escape of pathogens which may be more virulent than the typical Ghanaian isolate: all tests involving foreign isolates are carried out under controlled conditions in the laboratory, and all material is sterilised by autoclaving before disposal.

Diseased samples from countries outside West Africa where P. palmivora has been successfully isolated have already been received from St. Lucia, Western Samoa, Panama, Dominica, and Jamaica, and pure cultures from New Guinea and North Borneo: a rubber isolate has also been obtained from Malaya. The assistance received from these territories is gratefully acknowledged. Further samples of the fungus either as diseased tissue or in pure culture from countries not mentioned above would be most welcome. Pieces of tissue, from cacao or any other host, sealed in small polythene packets and sent in ordinary air mail envelopes, have been found to travel with reasonable success. The address is: W.A.C.R.I., P.O. Box 8, Tafo, Ghana.

P.D. Turner

? Reversible Reaction

"Pollution" has been delaid, we hope to send it in January - Reply to a book order. [Origin uncertain. ?Lat. pullus, a chicken.]

NORTHERN RHODESIA

MAIZE Streak disease has been increasing in severity over the past 4 seasons. Formerly only a disease of importance in areas of low altitude it is now quite prevalent on the plateau. A survey of this disease is being initiated.

WHEAT In the search for suitable wet season varieties (B. Mounter, Plant Breeder) the main problems have been control of weeds, in particular Eleusine indica, and control of Cochliobolus sativus which causes severe leaf blight and black point of the grain. A few varieties showing some resistance to C. sativus have been selected for further trials.

SORGHUM The main diseases are caused by Sclerospora sorghi, which often attacks the plant when young and does great damage to the leaves at all stages of development, and Puccinia purpurea, which is widespread and often severe, but not considered so important as downy mildew since it has only been observed to attack plants nearing maturity and is believed to cause slight reductions in yield.

GROUNDNUTS During the 1958-9 season rosette was very common throughout the territory. It was particularly severe in the Eastern Province where the production of groundnuts for export is a major industry. The outbreak was associated with abnormally large populations of the insect vector, Aphis craccivora. The disease caused almost complete crop failure in some localities and yields for the province as a whole are estimated to have been reduced by as much as 20 per cent.

The condition known as "pops", in which apparently healthy plants produce normal pods but no kernels, is very common throughout the Northern and North Western Provinces. In preliminary pot trials laid down by the Chemistry section (J. B. M. Vogt), responses to calcium and boron applications were apparent. These results are at present being tested on a field scale in some of the worst affected "pops" areas.

Leaf spot, Cercospora personata, has been on the increase over the past few years and is now in most areas as common as C. arachidicola. Late maturing varieties are in general fairly resistant, but early maturing varieties usually suffer severe defoliation. Applications of sulphur, Bordeaux, maneb, and zineb have all given highly significant increases in yield of early maturing varieties.

COWPEAS Very susceptible to attack by Ascochyta phaseolorum (target spot) which, under favourable conditions, is very destructive, all parts of the plant being attacked. The disease can proceed rapidly and can on occasion wipe out a crop. The fungus has now been recorded on the following host plants: Phaseolus vulgaris, P. lunatus, P. aureus, P. mungo, P. acutifolius, Vigna sesquipedalis, and V. coerulea, P. riccardianus, Voandzeia subterranea.

TOBACCO The growing of Turkish tobacco as a cash crop for Africans is developing into a promising peasant industry. The production of healthy seedlings being of first importance, the Department of Agriculture has so far only rarely allowed growers to produce their own seedlings. Seedbeds are, in general, managed or closely supervised by officers of the Department and rigorous disease control measures are taken. Most farmers get the seedlings they need from large communal seedbeds, and pay for them when the crop is sold. The greatest menace in the seedbeds has been anthracnose (Colletotrichum tabacum) which is now widespread in the Central and Southern Provinces. It has also been recorded from Kabompo and there are unconfirmed reports that it occurs in the Balovale District and in the Eastern Province. Current successful control measures include spraying with zineb or thiram. On one occasion when a grower had been allowed to produce his own seedlings the disease got into the field, where it was observed to do considerable damage to the plants right through to maturity.

Wildfire (Pseudomonas tabaci) was recorded for the first time at Mount Makulu Research Station during the 1958-9 season on Burley tobacco.

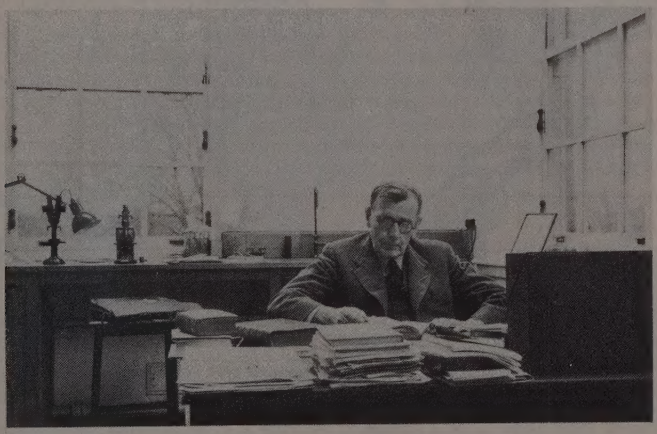
POTATOES The main diseases, viruses apart, are late blight (Phytophthora infestans) and bacterial wilt (Pseudomonas solanacearum). Blight, first recorded in 1953, is now widespread in the Southern, Central, Western, and Northern Provinces. So far it has not been recorded from Barotseland or the Eastern Province. Variety trials (in co-operation with the Salisbury Experiment Station) to observe field resistance are being carried out. Bacterial wilt has become very prevalent in the Central Province and is a potential menace to the seed growing industry.

CASSAVA This is an important food crop in the Northern Province and is a staple and a cash crop in the Balovale and Kabompo districts, the surplus produce being exported to Barotseland. Through the cassava growing areas there is a very high incidence of mosaic. Many stands inspected in the Northern and N. Western Provinces were 100 per cent. infected. The disease is believed to reduce greatly the yields. Selections made from the progeny of hybrid seed from East Africa are being bulked up and will be sent out to the cassava areas for testing (E. Mudenda, Plant Breeder). Another, and possibly more promising line of attack, is the search for mosaic resistant clones among local stocks.

A. Angus

RETIREMENT OF E. W. MASON, O.B.E., M.A., M.Sc.

On the 14th February Mr. E.W. Mason retired at the age of 70 after nearly 40 years service at the Institute. Plant pathologists and systematic mycologists throughout the Commonwealth have cause to remember with gratitude the help he has given them over this long period. Herb. I.M.I., which he started and for which he has fought many a good fight, is now a most useful working herbarium



with more than 80,000 specimens, all serially numbered and fully cross-indexed. Mason has always insisted that each species in a herbarium should have only one name and one place, and in this he has shown sound commonsense. Of his published papers, the 'Annotated accounts of fungi received at the Imperial Mycological Institute' are probably the most important: they will almost certainly be placed amongst the classics by future generations of mycologists.

He has always been ready to help others with the preparation of their papers, placing at their disposal his wide knowledge of fungi, of nomenclature, and botanical latin. He still has a room at the C.M.I. and we all hope that although he has retired from active administrative work he will continue for many years to enjoy looking at fungi.

M.B.E.

MAPS

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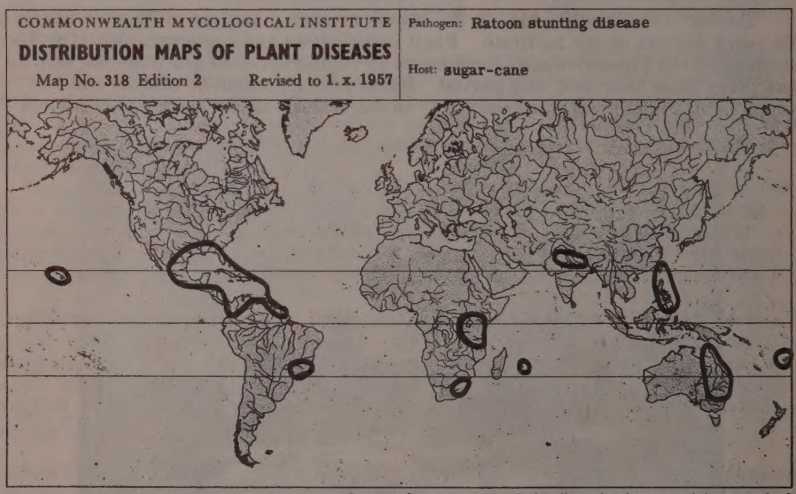
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